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SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JULY 24, 1908

CONTENTS

| | |
|--|-----|
| <i>The Salaries of Professors at American Colleges and Universities</i> | 97 |
| <i>The Teaching of Mathematics to Engineering Students in Foreign Countries:</i> PROFESSOR ALEXANDER ZIWET | 109 |
| <i>The British Bureau of Sleeping Sickness</i> ... | 113 |
| <i>Beauperthuy on Mosquito-born Diseases</i> | 114 |
| <i>Scientific Notes and News</i> | 114 |
| <i>University and Educational News</i> | 120 |
| <i>Discussion and Correspondence:—</i> | |
| <i>A Continuous Calorimeter:</i> PROFESSOR LINDLEY PYLE | 121 |
| <i>Quotations:—</i> | |
| <i>Academic Control in Germany</i> | 122 |
| <i>Scientific Books:—</i> | |
| <i>Vialleton's Un problème de l'évolution:</i> PROFESSOR CHARLES S. MINOT. <i>Spargo's The Common Sense of the Milk Question:</i> DR. WM. CREIGHTON WOODWARD | 122 |
| <i>Scientific Journals and Articles</i> | 124 |
| <i>Special Articles:—</i> | |
| <i>Observations on Change of Sex in Carica Papaya:</i> M. J. IORNS. <i>Observations on Medicago Lupulina L.:</i> G. T. FRENCH ... | 125 |
| <i>Societies and Academies:—</i> | |
| <i>The Geological Society of Washington:</i> DR. RALPH ARNOLD. <i>The New York Section of the American Chemical Society:</i> DR. C. M. JOYCE | 127 |

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y., or during the present summer to Wood's Hole, Mass.

THE SALARIES OF PROFESSORS IN AMERICAN COLLEGES AND UNIVERSITIES¹

THE Carnegie Foundation for the Advancement of Teaching, in seeking to carry out its primary object of establishing a retiring allowance system in the colleges, universities, and technical schools of the United States, the Dominion of Canada, and Newfoundland, has found it necessary to conduct various enquiries into the condition of education in these three countries. Among the first of these studies was one which had to do with the salary and tenure of office of the professor and of other officers of instruction. The results of that study are given in the present bulletin and are based upon data supplied by some seven hundred and fifty institutions in the United States and Canada, the figures given in all cases being presented exactly as they were received from the officers of these institutions.

The organization of colleges and universities in the United States is fashioned very much after that of business corporations; the board of trustees corresponding to the board of directors, the chairman of the board to the chairman of the board of directors, the president of the college to the general manager. The president is the connecting link between the administrative body of trustees on the one side and the teaching body on the other.

¹ From Bulletin number two of the Carnegie Foundation for the Advancement of Teaching. This bulletin, entitled "The Financial Status of the Professors in America and in Germany," contains much additional information and discussion.

In Canada the organization is somewhat more democratic, the governing boards in most cases being elected from the alumni and containing generally members of the faculty.

The instructing staff in most institutions, both in the United States and Canada, consists of professors, associate professors, and assistant or adjunct professors. These form the faculty or permanent body of teachers. In addition there are grades of instructors, lecturers, tutors and assistants whose positions are in great or less measure temporary.

Not all of these offices appear in all institutions. Even in some of the larger universities there are only two grades in the faculty, the professor and assistant or adjunct professor. In many smaller colleges the greater part of the teaching staff is included in the faculty with a very limited number of instructors and assistants. The grade of preceptor is unique in Princeton, where its holders are considered of faculty rank.

While this paper will deal, so far as seems necessary to render clear the status of the professor, with all of these grades of the instructing staff, it is upon the holder of the professorial title as embodying the force and tradition of college teaching that the attention will be principally directed.

As was pointed out in the second annual report of the president of the foundation, the words "college" and "university" have no well settled meaning in America, nor is the sphere of higher education by any means carefully defined. As a result the degree-giving institutions in these countries present every variety of educational and administrative complexity. Even the well-informed educator is apt to speak of our colleges and universities as if they formed a homogeneous species conforming more or less clearly to some

typical condition. Not only is this not the fact, but these institutions do not even fall into any definite number of such species. There is no method of classification which, when applied to the thousand American and Canadian degree-conferring institutions, will enable the student to divide them into clear species. Whatever criterion is chosen will result in placing some institutions in company to which they are not entitled to belong.

The number of students, or the "bigness" of the college or university, is probably the most usual method of classification. But in regard to the number of students one finds a range continuous from institutions with fifty students to institutions with five thousand, and if in this continuous series arbitrary lines are drawn, the groups thus made put together institutions whose consideration side by side could serve no useful purpose; for instance, Johns Hopkins University with the University of Southern California, Yale University with the Temple College, and Williams College with Maryville College.

The size of the teaching staff would naturally be considered a more scientific method of classification, but here again there is a continuous gradation from institutions with five to institutions with five hundred teachers, and groups selected on this basis would result in such incongruities as placing Valparaiso University with Leland Stanford Junior University, Union College, Nebraska, with Amherst College, and Howard College at Birmingham, Alabama, with Ripon College.

The maintenance of professional schools might be considered as a significant line of cleavage, but such a means of demarcation, which would put in the supposedly less important group Princeton, Brown, Wesleyan, Vassar, Bryn Mawr, and Trinity (Hartford), and in the higher

group such institutions as Hamline University, Epworth University, Baylor University, Kansas City University, and some forty or fifty other essentially minor institutions can not be considered an illuminating classification.

The presence of a certain number of resident graduate students is a significant feature of an institution for higher education, and might be used with advantage in a classification if graduate students in the various institutions had to comply with similar requirements before being enrolled. It is true that the graduate student must have received a college degree, but a collegiate degree in the United States means anything from a bachelor of arts or a bachelor of science of such an institution as the Ohio Northern University, Ada, Ohio, up to the bachelor of arts and bachelor of science of such universities as Columbia, and the University of Chicago. Until the collegiate degrees begin to have a definite meaning, it will be futile to base any classification upon the graduate schools, which essentially rest upon these degrees.

The annual income is one of the better ways of grouping American colleges and universities, because a "dollar" is somewhat the same all over the United States; whereas a "student" may mean a person in the "school of oratory" or a candidate for the degree of doctor of philosophy. The word "teacher" may mean a full professor working exclusively for his college or a musician in Chicago who is the "non-resident director" of the schools of music of a chain of small colleges throughout Illinois and the adjacent states, the same individual being counted thus in a score or more of college catalogues. The test of annual income, however, fails to divide institutions into any sharp groups. The institutions range almost continuously from so-called colleges receiving an annual in-

come of eight hundred and fifty dollars up to universities with a yearly budget of a million and a half dollars. It is true that between six hundred and fifty thousand dollars a year income and eight hundred and fifty thousand dollars a year income occurs a break, but there does not seem any solid reason why the ten universities above this break should be considered apart from the Universities of Missouri, Toronto, Pennsylvania, Minnesota and Nebraska, which come immediately below.

It must also be noted that the figures in regard to annual incomes are not absolutely to be relied upon. Many institutions say frankly that the return under this head is only an approximation, and although the foundation has made every effort to exclude such extraordinary items as gifts, special legislative appropriations for the erection of buildings, etc., from this calculation of annual incomes, it can not feel certain that in all cases the figures given under this head represent the normal yearly income of the institution—the income which can be devoted to running expenses. Thus the Ohio State University at Columbus, in estimating its annual income, included the unexpended balance of a legislative appropriation for building operations granted several years before, and Harvard University included in its annual income the value of certain securities which it had sold during the year in order to make a reinvestment. The foundation has been unable to obtain copies of all college treasurers' reports, and so has been unable to check all the returns made. Such inclusion of building appropriation, bookkeeping items, etc., will doubtless account for some cases where, according to the institution figures, a disproportionately small percentage of the income is devoted to the salaries of the instructing staff. In many small colleges, on the other hand, the regular income is

insufficient to pay the salary account, and it is necessary every year to make up the deficiency by the solicitations of gifts.

It may be mentioned here that the income of the University of Oregon, as given in the following table, is the income appropriated for it by the legislature a year and a half ago. The legislature of 1907 passed an act making an annual appropriation to the university of \$125,000, but the referendum has been invoked against this act under the new initiative and referendum provision of the constitution of Oregon and the university, therefore, can not tell whether it will receive this appropriation until the referendum is held in June (1908). In the meantime, the university has to maintain itself upon the remnant of the old appropriation. This is the first time that the initiative and referendum has appeared in higher education in the United States.

Besides these reasons for not favoring the annual income as a means of classification, it should also be noted that in many institutions, particularly in women's colleges, the payments of the students for board are included in the income of the college. Wherever this is the case it is indicated in the table by a footnote. But while this footnote guards the reader from error, it does not enable the figures thus "starred" to be used for any useful purpose of calculation. To accept an income so calculated as if it were a real income would indicate that Vassar College was in receipt of a larger revenue than Princeton University, and the Randolph-Macon Woman's College than Radcliffe.

Since American colleges and universities fail under any system of classification to fall into natural groups, the only available method is to choose arbitrarily a system which is most useful for the purpose in view. A system of classification based on the amount of money expended

annually for teachers' salaries has been adopted. This system results in incongruities. It places the College of the City of New York above the University of Virginia, and the Agricultural College of Utah above Clark University. But it results in fewer incongruous arrangements than any other single criterion.

There is one grave fault in this system of classification, and that is the impossibility of bringing within it the colleges and universities of the Roman Catholic Church. Almost all of these institutions are under the control of religious orders, and at least in the collegiate and graduate departments the teachers are priests who receive in money but a nominal compensation. The University of Notre Dame du Lac (Congregation of the Holy Cross) and Georgetown University (Society of Jesus), possessing incomes equal to those of Syracuse University and of Colgate University, must thus be omitted from this calculation, together with a number of less wealthy institutions whose revenues are on the scale of Rutgers and of De Pauw. But while the omission of these colleges and universities makes the list look incomplete, the omission is really unimportant in the economic sense. It would be meaningless to attempt a financial comparison between teachers to whom teaching is an ordinary economic function and teachers whose teaching is a part of their priestly duties. At some future time the foundation hopes to present from the pen of a distinguished ecclesiastic an adequate study of the Roman Catholic institutions.

The calculation on the basis of teachers' salaries will also be inadequate in regard to such institutions as New York University, where, as its syndic reports, a number of professors in all departments donate their services, in whole or in part, to the university. It will be necessary also to consider carefully the cases where

houses or apartments are added to the salaries of the members of the instructing staff. The houses at the University of Virginia and the suites of rooms at some of the colleges of the University of Toronto are a considerable addition to the stated salary, and even when, as at Washington and Lee University, a charge is made for the houses allotted to professors, the charge, in view of the character of the residence, is a nominal one.

Taking the salaries paid to teachers as a basis of classification of American and Canadian degree-giving institutions, we have the following table:

TABLE I
Institutions Classified by Expenditure for Teachers' Salaries

| Number of Institutions | Figures Indicating Range of Expenditure for Teachers' Salaries |
|------------------------|--|
| 92 | \$ 5,000-\$10,000 |
| 91 | 10,000- 15,000 |
| 48 | 15,000- 20,000 |
| 29 | 20,000- 25,000 |
| 19 | 25,000- 30,000 |
| 18 | 30,000- 35,000 |
| 17 | 35,000- 40,000 |
| 17 | 40,000- 45,000 |
| 7 | 45,000- 50,000 |
| 6 | 50,000- 55,000 |
| 7 | 55,000- 60,000 |
| 8 | 60,000- 65,000 |
| 8 | 65,000- 70,000 |
| 4 | 70,000- 75,000 |
| 2 | 75,000- 80,000 |
| 4 | 80,000- 85,000 |
| 2 | 85,000- 90,000 |
| 1 | 90,000- 95,000 |
| 3 | 95,000-100,000 |
| 2 | 100,000-105,000 |
| 2 | 105,000-110,000 |
| 4 | 110,000-115,000 |
| 2 | 115,000-120,000 |
| 4 | 120,000-125,000 |
| 8 | 125,000-150,000 |
| 2 | 150,000-175,000 |
| 5 | 175,000-200,000 |
| 3 ² | 200,000-225,000 |

² Johns Hopkins University, Northwestern University, New York University.

| | |
|-----------------------|-----------------|
| 4 ³ | 225,000-250,000 |
| 1 ⁴ | 250,000-300,000 |
| 4 ⁵ | 300,000-400,000 |
| 4 ⁶ | 400,000-500,000 |
| 3 ⁷ | 500,000-600,000 |
| University of Chicago | \$ 699,000 |
| Harvard University | 841,000 |
| Columbia University | 1,145,000 |

It will be seen from the table that five ninths of the institutions making reports have an instructional pay-roll of less than twenty thousand dollars. Failure to report this item is very common among the smaller institutions. Almost all the large institutions, on the other hand, send in this report. It is, therefore, safe to say that if the figures were obtainable in every case, two thirds of the degree-granting institutions of the United States and of Canada would show a budget for teachers' salaries of less than twenty thousand dollars. Seven ninths of the institutions making reports spend less than fifty thousand dollars on instructional salaries. If the list were complete, institutions of this character would number six sevenths of those granting degrees.

The average salary of a professor is reported in many more cases by the college authorities than is the college's total annual expenditure in professional and other instructing salaries. From a study of these figures it appears that one third of the degree-granting institutions pay on an average less than a thousand dollars a year to their full professors; indeed, in

³ McGill University, University of Missouri, University of Nebraska, Ohio State University (Columbus).

⁴ University of Minnesota.

⁵ Massachusetts Institute of Technology, Princeton University, University of Toronto, Leland Stanford Junior University.

⁶ University of California, University of Pennsylvania, University of Wisconsin, University of Illinois.

⁷ Cornell University, Yale University, University of Michigan.

thirty-five institutions making reports the average salary of the full professor is less than five hundred dollars a year. These salaries are poor enough under any circumstances, but it must be remembered that most of the institutions paying such salaries are not colleges in any sense, except that they are called colleges and that they confer collegiate degrees. These poorly paid professors are therefore not really doing the work of higher education, nor have they in most cases given themselves adequate preparation for college teaching. In the vast majority of cases these professors are teaching high-school and even grammar-school subjects; they have devoted to their training only the time ordinarily given to preparation by a teacher in secondary education; and their salaries, although small, are not so utterly incommensurate as they would be if paid to a professor doing collegiate work.

To study the financial standing of the teachers in all of the degree-granting institutions would therefore be to deal with a large number of institutions that are simply high schools. Conclusions drawn from such a heterogeneous group would be of little value. Yet to draw a line across this ascending scale of college salary budgets is a difficult task. Wherever the line is drawn there will be reasons for moving it down to include a few more institutions or up to have it exclude a few others.

It will necessarily be an arbitrary line, but at one place in the gradation of institutions it will be less an arbitrary line than if drawn at any other place. A glance at Table I. shows that at the point where forty-five thousand dollars a year is spent on salaries to the instructing staff the number of institutions drops sharply. Above this abrupt drop are one hundred and three institutions. Let us, therefore, take these institutions as typical of Ameri-

can higher education, and see what are the results obtained from an analysis of the status of their professors and instructors. Table II. gives these one hundred and three institutions, with their appropriate figures, in the order of their annual expenditure in teachers' salaries.

It may be that there are colleges not included in Table II. which are better representatives of higher education than some which are there listed. The table does not pretend to give the one hundred institutions in America which are the best from an educational point of view, any more than the arrangement of institutions in the table is meant to indicate anything beyond the total size of the annual salary accounts. The value of this table is that it is an impersonal selection of colleges and universities according to a fairly representative criterion. For the purpose of this table, it is more valuable to have the selection made according to an objective standard which every one can estimate, than to have a more exact approximation into which personal judgment enters.

The foundation recognizes, however, that the salary budget of an institution is closely related to the size of the institution, and that the size of a college is an imperfect method of estimating its educational value. Table IX., in a later part of this paper, is therefore intended as a necessary supplement to Table II. It contains the names of fifty-four institutions, which were not included in Table II. on account of the comparative smallness of their expenditure for salaries, and yet which in the opinion of the foundation ought to be considered if the higher education of the United States is to be rightly estimated. Table IX. and the discussion thereon will show what excellent educational results can be obtained by resources which are within moderate limits.

These two tables, the one a purely ob-

jective selection on a mathematical basis, the other an attempt of the foundation to correct the false impression which a selection only on that standard might give, will together present an approximately complete statement of the financial status of the teacher in the institutions of higher education in the United States and Canada. Nevertheless the total number of institutions which assume to deal with the higher education can not be disregarded, although many of them are occupied in a large part with education that is not of a collegiate grade. While these colleges of meager support and limited facilities can not be grouped, as mentioned before, in significant educational divisions, it is evident to one who studies the countries as a whole that the problem of higher institutions must be taken up from the standpoint of the state or province as a unit. The state governments have themselves in all cases a system of education limited by state lines. The same denominations have erected colleges and universities in different states, so that the problem of higher education is almost necessarily studied from the standpoint of the state.

Looked at from this standpoint, it is evident that if the system of higher education is finally to have unity, strength, and thoroughness, enormous sums of money must be spent to develop these numerous institutions, or else many of them must be in the end abandoned. One can scarcely doubt that the latter course will finally come about by the mere progress of events, for there can be no doubt that many of these institutions are wholly unnecessary. They have been produced partly from a genuine interest in education; partly by denominational and local rivalry; sometimes by the enterprise of real estate agents; and under a system of laws which allowed any group of men to come together and call the institution which they founded a college. There are in most

states many more such institutions than are necessary for the work of higher education and the multiplication of the number undoubtedly lowers the general standard of institutions.

Thus the State of Iowa contains six institutions of higher education in organic connection with the Methodist Episcopal Church.⁸ Two of these, Cornell College and Upper Iowa University, are both under the control of the Upper Iowa Conference of that church. The combined revenues of these six institutions are only a little over one fifth of the sum appropriated each year by the people for the support of the state university. They about equal the annual revenue of Vanderbilt University. It is apparent that here has been a great dissipation of energy, when by a wise concentration of resources the Methodists of Iowa could have built up a single institution comparable with the excellent facilities of Vanderbilt, and able, if its organization had not been too widely extended, to have been an admirable colleague of the state university. The Presbyterian Church has also controlled four colleges in Iowa,⁹ whose incomes, if combined, would have been equal to the incomes of Haverford or of Lafayette.

In Ohio the Methodist Episcopal Church has founded or given its official patronage to five separate institutions of learning.¹⁰

⁸ Cornell College, Mount Vernon; Morningside College, Sioux City; Simpson College, Indianola; Upper Iowa University, Fayette; Iowa Wesleyan University, Mount Pleasant; and Charles City College, Charles City.

⁹ Coe College, Cedar Rapids; Parsons College, Fairfield; Buena Vista College, Storm Lake; Lenox College, Hopkinton. Coe College, however, with the consent of the Synod of Iowa has recently taken into consideration an abrogation of this relationship to the Presbyterian Church.

¹⁰ Ohio Wesleyan University, Delaware; Ohio Northern University, Ada; Mount Union College, Alliance; Scio College, Scio; and Baldwin University and the German Wallace College, Berea.

TABLE II

*Degree-conferring Institutions in the United States and Canada appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*¹¹

| Institution | Total Annual Income | Annual Appropriation for Salaries of Instructing Staff | Average Salary of Professor | Average Age at Entrance to Grade of Professor | Average Salary of Associate Professor | Average Salary of Assistant Professor | Total Number of Students in University | Total Instructing Staff in University | Ratio | Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools | Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools | Average Salary \$2,048 Cost per Student \$280 Ratio |
|------------------------------------|---------------------|--|-----------------------------|---|---------------------------------------|---------------------------------------|--|---------------------------------------|-------|---|--|---|
| Columbia Univ..... | \$1,675,000 | \$1,145,000 | \$4,289 | 37.5 | | \$2,201 | 4,087 | 559 | 7.3 | 2,545 | 253 | 10 |
| Harvard Univ..... | 1,827,789 | 841,970 | 4,413 | 39 | \$3,600 | 2,719 | 4,012 | 573 | 7 | 2,836 | 322 | 8.8 |
| ¹⁹ Univ. of Chicago.... | 1,304,000 | 699,000 | 3,600 | | 2,800 | 2,200 | 5,070 | 291 | 17.4 | 3,902 | 211 | 18.4 |
| Univ. of Michigan.... | 1,078,000 | 536,000 | 2,763 | | 2,009 | 1,624 | 4,282 | 285 | 15 | 2,899 | 198 | 14.6 |
| Yale Univ..... | 1,088,921 | 524,577 | 3,500 | 35 | | 2,000 | 3,306 | 365 | 9 | 2,620 | 236 | 11.1 |
| ¹² Cornell Univ..... | 1,082,513 | 510,931 | 3,135 | | | 1,715 | 3,635 | 507 | 7.1 | 2,917 | 283 | 10.3 |
| Univ. of Illinois..... | 1,200,000 | 491,675 | 2,851 | | 2,168 | 1,851 | 3,605 | 414 | 8.7 | 2,281 | 190 | 12 |
| Univ. of Wisconsin.... | 998,634 | 489,810 | 2,772 | 32.8 | 2,081 | 1,636 | 3,116 | 297 | 10.4 | 2,558 | 231 | 11 |
| Univ. of Penna..... | 589,226 | 433,311 | 3,500 | | | 1,850 | 3,700 | 375 | 9.8 | 2,618 | 166 | 15.7 |
| Univ. of California... | 844,000 | 408,000 | 3,300 | | 2,200 | 1,620 | 2,987 | 350 | 8.5 | 2,451 | 218 | 11.2 |
| Stanford Univ..... | 850,000 | 365,000 | 4,000 | 35 | 2,700 | 2,000 | | | | ¹⁷ 1,668 | 146 | 10.7 |
| Univ. of Toronto..... | 610,000 | 324,000 | 3,600 | 42.5 | | 2,400 | 3,498 | 368 | 9.5 | 1,732 | 153 | 11.3 |
| ¹⁴ Princeton Univ. | 442,232 | 308,650 | 2,914 | 35 | | 1,824 | | | | 1,301 | 158 | 8.2 |
| Massachusetts Inst. ... | 505,000 | 301,000 | 3,192 | 38 | 2,115 | 1,653 | | | | 1,415 | 211 | 6.7 |
| Univ. of Minnesota... | 515,000 | 263,000 | 2,600 | 32 | | 1,700 | 3,889 | 303 | 12.8 | 2,169 | 116 | 18.6 |
| Ohio State Univ..... | 475,000 | 244,000 | 2,041 | | 1,692 | 1,400 | 2,014 | 127 | 15.8 | 1,376 | 87 | 15.8 |
| Univ. of Nebraska.... | 425,000 | 240,000 | 2,200 | 35 | | 1,500 | 2,886 | 173 | 16.6 | 1,808 | 90 | 20 |
| Univ. of Missouri..... | 655,000 | 239,110 | 2,355 | 33 | | 1,575 | 2,070 | 144 | 14.3 | 1,360 | 101 | 13.4 |
| McGill Univ..... | 425,000 | 225,000 | 3,060 | | 2,150 | 1,700 | 1,163 | 191 | 6 | 542 | 95 | 5.7 |
| New York Univ..... | 303,500 | 220,000 | 3,466 | | | 1,830 | 3,110 | 211 | 14.7 | 827 | 46 | 17.9 |
| Northwestern Univ... | 491,132 | 218,157 | 3,265 | 35 | 2,325 | 1,535 | 2,485 | 261 | 9.5 | 936 | 56 | 16.7 |
| Johns Hopkins Univ.. | 311,870 | 211,013 | 3,184 | | | 1,344 | 651 | 172 | 3.7 | 328 | 75 | 4.3 |
| Univ. of Texas..... | 339,577 | 199,394 | 2,889 | 32.5 | 2,300 | 1,893 | 1,693 | 110 | 15.3 | 1,169 | 80 | 14.5 |
| Syracuse Univ..... | 279,000 | 180,000 | 1,806 | | 1,291 | 978 | 2,875 | 199 | 14.4 | 1,807 | 89 | 20.3 |
| Smith College..... | 278,717 | 177,150 | 2,150 | | | 1,646 | | | | 1,482 | 97 | 15.2 |
| Univ. of Kansas..... | 285,000 | 176,000 | 2,100 | | 1,600 | 1,200 | 1,786 | 126 | 14.1 | 1,282 | 97 | 13.2 |
| N. Y. City College.... | 455,000 | 175,270 | 4,788 | | 3,189 | 2,250 | | | | | | |
| State Univ. of Iowa... | 324,048 | 173,355 | 2,152 | 37.5 | | 1,271 | 1,791 | 149 | 12 | 1,200 | 86 | 13.9 |
| Dartmouth College... | 250,000 | 155,000 | 2,600 | 40 | 2,200 | 1,800 | 1,219 | 88 | 13.8 | 1,161 | 70 | 16.5 |
| Tulane Univ..... | 274,000 | 146,000 | 3,000 | 35 | 2,000 | 1,500 | 1,433 | 148 | 9.6 | 525 | 55 | 9.5 |
| Iowa State College.... | 210,000 | 140,286 | 2,000 | | 1,600 | 1,300 | | | | 1,098 | 108 | 10.1 |
| ¹⁶ Wellesley College... | 438,493 | 136,586 | 1,900 | | | 1,350 | | | | 1,209 | 118 | 10.2 |
| Vassar College..... | 483,000 | 129,500 | 2,896 | | | 1,690 | | | | 996 | 81 | 12.2 |
| Kansas State College.. | 393,500 | 129,100 | 2,140 | 34.5 | | 1,435 | | | | 1,034 | 69 | 14.9 |
| Indiana Univ..... | 215,000 | 129,000 | 2,400 | 35 | 1,707 | 1,200 | | | | | | |
| Purdue Univ..... | 255,000 | 128,920 | 2,200 | | | 1,800 | 1,713 | 124 | 13.8 | 1,605 | 119 | 13.4 |
| Oberlin College..... | 223,729 | 128,400 | 1,941 | 33 | | 1,250 | 1,406 | 109 | 12.8 | 803 | 44 | 18.2 |
| Univ. of Cincinnati... | 254,699 | 123,141 | 3,000 | 35 | 2,000 | 1,300 | 994 | 120 | 8.2 | 638 | 52 | 12.2 |
| Armour Institute..... | 215,000 | 123,000 | 2,150 | 35 | 1,682 | 1,328 | | | | 622 | 62 | 10 |
| Univ. of Virginia..... | 202,190 | 122,960 | 3,100 | 35 | | 1,425 | 785 | 91 | 8.6 | 467 | 61 | 7.6 |
| Univ. of Washington. | 202,000 | 122,400 | 1,950 | | 1,700 | 1,450 | 1,061 | 72 | 14.7 | 907 | 64 | 14.1 |
| Westrn. Reserve Univ. | 179,661 | 116,141 | 2,700 | | 1,880 | 1,790 | 914 | 155 | 5.8 | 566 | 53 | 10.6 |
| Agric. Col. of Utah.... | 130,566 | 115,400 | 1,800 | 35 | | 1,300 | | | | 530 | 55 | 9.6 |
| ¹⁵ Brown Univ..... | 214,198 | 114,630 | 2,680 | 37 | 1,843 | 4,389 | | | | 924 | 81 | 11.4 |
| Washington Univ..... | 158,051 | 114,034 | 2,471 | | | 1,400 | 1,124 | 174 | 6.4 | 331 | 45 | 7.3 |
| West Virginia Univ... | 200,000 | 110,000 | 2,080 | 35 | 1,600 | 1,350 | 667 | 62 | 10.7 | 284 | 41 | 6.9 |
| Michigan State Col... | 325,000 | 110,000 | 2,300 | 34 | 2,000 | 1,200 | | | | 683 | 78 | 8.7 |
| Lehigh Univ..... | 166,500 | 107,000 | 2,137 | 30 | | 1,537 | | | | 674 | 75 | 11.8 |

TABLE II—continued

*Degree-conferring Institutions in the United States and Canada Appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*¹¹

| Institution | Total Annual Income | Annual Appropriation for Salaries of Instructing Staff | Average Salary of Professor | Average Age at Entrance to Grade of Professor | Average Salary of Associate Professor | Average Salary of Assistant Professor | Total Number of Students in University | Total Instructing Staff in University | Ratio | Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools | Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools | Average Salary \$2,048. Cost per Student \$280. Ratio |
|------------------------------------|---------------------|--|-----------------------------|---|---------------------------------------|---------------------------------------|--|---------------------------------------|-------|---|--|---|
| Bryn Mawr College... | \$126,808 | \$106,687 | \$2,500 | | \$2,000 | \$1,500 | | | | 362 | 47 | 7.7 |
| Tufts College..... | 180,000 | 104,600 | 1,870 | | | 1,375 | 1,083 | 198 | 5.4 | 453 | 45 | 10 |
| George Wash. Univ... | 189,643 | 101,610 | 1,693 | 32.5 | | 1,094 | 1,258 | 196 | 6.4 | 643 | 82 | 7.8 |
| Penna. State College.. | 251,920 | 97,190 | 2,010 | | | 1,390 | | | | 784 | 81 | 9.6 |
| Univ. of Colorado..... | 175,000 | 95,000 | 2,050 | 32 | | 1,400 | 840 | 112 | 7.5 | 726 | 57 | 12.7 |
| Williams College..... | 168,000 | 95,000 | 2,714 | 32 | 2,100 | 1,730 | | | | 475 | 58 | 8.1 |
| Clemson Agric. Col... | 271,720 | 93,650 | 2,100 | | 1,800 | 1,400 | | | | 658 | 41 | 16 |
| Univ. of Utah..... | 156,000 | 85,653 | 1,881 | | 1,900 | 1,700 | 565 | 50 | 11.3 | 390 | 39 | 10 |
| Amherst College..... | 133,214 | 85,500 | 2,853 | 36 | 1,700 | 1,566 | | | | 513 | 38 | 13.5 |
| Vanderbilt Univ..... | 169,000 | 83,000 | 2,800 | | 1,900 | 1,400 | 902 | 110 | 8.1 | 342 | 44 | 7.7 |
| Boston Univ..... | 186,484 | 82,340 | 2,419 | 35 | | 1,628 | 1,428 | 150 | 9.5 | 519 | 34 | 15.2 |
| ¹⁴ Mount Holyoke Col. | 225,000 | 81,000 | 1,350 | 40 | | 1,100 | | | | 711 | 87 | 8.1 |
| State Col. of Wash.... | 130,000 | 80,000 | 1,750 | 35 | 1,700 | 1,400 | | | | 1,100 | 65 | 16.9 |
| ¹⁵ Univ. of Tennessee.. | 153,877 | 78,000 | 2,000 | 39 | 1,600 | 1,300 | 694 | 106 | 6.5 | 353 | 34 | 10.3 |
| Western Univ. of Pa... | 137,139 | 76,617 | 1,864 | 38 | | | 966 | 144 | 6.7 | 187 | 23 | 8.1 |
| Texas College..... | 160,000 | 74,000 | 2,000 | | | 1,300 | | | | 623 | 52 | 11.9 |
| Univ. of North Car... | 104,121 | 72,326 | 1,975 | | | 1,242 | 731 | 73 | 10 | 483 | 48 | 10 |
| State Univ. Oklahoma | 110,000 | 72,274 | 1,800 | | | 1,400 | 394 | 36 | 10.9 | 201 | 28 | 7.1 |
| Clark Univ..... | 145,000 | 70,000 | 3,000 | | | 1,650 | | | | 159 | 37 | 4.2 |
| Stevens Inst. of Tech. | 108,000 | 69,000 | 3,200 | | | 2,000 | | | | 429 | 42 | 10.2 |
| Univ. of Maine..... | 135,000 | 69,357 | 1,800 | 34 | 1,500 | 1,200 | 702 | 74 | 9.4 | 514 | 50 | 10.2 |
| Drake Univ..... | 101,856 | 67,849 | 1,500 | 32 | | 1,000 | 866 | 93 | 9.3 | 515 | 20 | 25.7 |
| Miami Univ..... | 113,000 | 66,300 | 2,000 | | 1,650 | 1,150 | 570 | 41 | 13.9 | 313 | 28 | 11.1 |
| Ohio Wesleyan Univ. | 165,000 | 66,000 | 1,800 | | 1,300 | 850 | 1,178 | 119 | 9.8 | 580 | 43 | 13.4 |
| Univ. North Dakota.. | 153,136 | 65,500 | 2,200 | 35 | | 1,550 | 425 | 49 | 8.6 | 230 | 30 | 7.6 |
| Wesleyan Univ..... | 123,000 | 65,000 | 2,575 | 33 | | 1,750 | | | | 316 | 29 | 10.8 |
| Alabama Polyt. Inst.. | 92,000 | 65,000 | 2,000 | | 1,700 | 1,500 | | | | 543 | 50 | 10.8 |
| Worcester Polyt. Inst.. | 89,594 | 61,107 | 2,369 | | | 1,725 | | | | 465 | 46 | 10.1 |
| Simmons College..... | 127,024 | 61,000 | 2,900 | | 2,266 | 1,660 | | | | 545 | 59 | 9.2 |
| Colgate Univ..... | 114,532 | 60,930 | 1,740 | | | 1,500 | | | | 287 | 24 | 11.9 |
| Va. Polytechnic Inst. | 118,000 | 60,764 | 1,980 | 33 | | 1,260 | | | | 577 | 57 | 10.1 |
| Case Sch. Applied Sci. | 145,500 | 60,205 | 2,861 | 32.5 | | 1,443 | | | | 440 | 40 | 11 |
| Ohio Univ..... | 165,000 | 60,160 | 1,900 | 25 | 1,600 | 900 | 1,224 | 38 | 32.2 | 414 | 21 | 19.7 |
| Union Univ..... | 110,126 | 60,159 | 2,300 | 35 | | 1,400 | 627 | 108 | 5.7 | 270 | 33 | 8.1 |
| Univ. of Vermont..... | 105,000 | 60,000 | 2,100 | 35 | 1,650 | 1,375 | 497 | 65 | 7.6 | 345 | 37 | 9.3 |
| Rensselaer Poly. Inst. | 110,400 | 58,721 | 3,300 | 35 | 2,500 | 1,800 | | | | 485 | 29 | 16.8 |
| Howard Univ..... | 91,555 | 58,619 | 1,837 | 32.5 | | 1,000 | 785 | 92 | 8.5 | 265 | 17 | 10.1 |
| Queen's University... | 88,221 | 58,351 | 2,000 | | | 1,200 | 1,134 | 80 | 14.1 | 914 | 48 | 19 |
| Univ. of Mississippi... | 105,000 | 57,300 | 2,000 | | 1,325 | 1,000 | 344 | 28 | 12.2 | 274 | 24 | 11.4 |
| Univ. of S. Dakota... | 80,000 | 56,000 | 1,650 | | | 1,100 | 359 | 44 | 8.1 | 173 | 18 | 9.6 |
| Swarthmore College... | 84,000 | 55,335 | 2,100 | | | 1,400 | | | | 332 | 36 | 9.2 |
| Ga. Sch. Technology. | 82,500 | 55,000 | 1,945 | | | 1,000 | | | | 562 | 42 | 13.3 |
| Univ. of Idaho..... | 99,639 | 54,920 | 1,800 | | | 1,581 | | | | 231 | 28 | 8.2 |
| Temple College..... | 72,895 | 54,272 | 1,500 | 35 | | | 2,343 | 198 | 11.8 | 199 | 31 | 6.4 |
| Radcliffe College..... | 90,000 | 53,000 | 1,500 | | | | | | | | | |
| Rutgers College..... | 87,000 | 53,000 | 2,300 | | | 1,600 | | | | 255 | 34 | 7.5 |
| North Dakota College | 114,000 | 52,150 | 2,000 | 30 | | 1,300 | | | | 820 | 33 | 24.8 |

TABLE II—continued

*Degree-conferring Institutions in the United States and Canada appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*¹¹

| Institution | Total Annual Income | Annual Appropriation for Salaries of Instructing Staff | Average Salary of Professors | Average Age at Entrance to Grade of Professor | Average Salary of Associate Professor | Average Salary of Assistant Professor | Total Number of Students in University | Total Instructing Staff in University | Ratio | Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools | Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools | Average Salary \$2,048 Cost per Student \$280 Ratio |
|------------------------|---------------------|--|------------------------------|---|---------------------------------------|---------------------------------------|--|---------------------------------------|-------|---|--|---|
| Wash. and Lee Univ. | \$70,000 | \$50,000 | \$2,600 | 35 | | \$1,500 | 468 | 35 | 13.3 | 385 | 32 | 12 |
| State Univ. of Ky..... | 90,247 | 49,250 | 2,000 | 33 | | 1,200 | | | | 466 | 43 | 10.8 |
| James Millikin Univ. | 64,003 | 49,160 | 1,400 | 30 | | 1,000 | | | | 231 | 32 | 7.2 |
| N. Carolina College... | 114,000 | 49,000 | 2,000 | 30 | | 1,240 | | | | | | |
| Montana State College | 133,000 | 48,650 | 1,800 | | | 1,500 | | | | 291 | 32 | 9 |
| Univ. of Oregon..... | 60,000 | 47,927 | 1,800 | 40 | | 1,400 | 570 | 87 | 6.5 | 340 | 34 | 10 |
| Haverford College..... | 78,650 | 45,300 | 3,440 | 35 | | 2,240 | | | | 143 | 22 | 6.5 |
| Univ. of Rochester... | 60,334 | 45,000 | 2,383 | | | 1,750 | | | | 340 | 21 | 16.1 |

¹¹ The data for instructors and assistants are omitted.

¹² Not including Medical School.

¹³ Including the preceptors as assistant professors.

¹⁴ Including payments of students for board.

¹⁵ Most of the faculty receive a small extra compensation for teaching at the Women's College.

¹⁶ Faculty consists of members of the faculty of Harvard University, paid a certain amount per course.

¹⁷ Law students are not classified separately from collegiate undergraduates.

¹⁸ A combination of the average salary of associates, \$1,469, and the average salary of instructors, \$1,050.

¹⁹ Professors who are heads of departments receive on an average \$5,800.

The Presbyterian Synod of Tennessee (north) elects the trustees of Maryville College, and also the trustees of Greenville and Tusculum Colleges. Washington College, while its trustees are not elected by the synod, is a Presbyterian institution. All three of these colleges are located in the mountainous region of East Tennessee. The Northern Presbyterian Church, through its recent union with the Cumberland Presbyterian Church, has also come into possession of Cumberland University in Central Tennessee. The Southern Presbyterian Church has a university in West Tennessee. If all of these institutions are really devoted to higher education, it is evident that one or more of them are superfluous. Throughout the country there are numerous instances of single bodies in one denomination, like the

Northern Presbyterian Synod of Tennessee, having within their own limited area more than one college or university. There is something pathetic in the devotion which is poured into some of these unnecessary colleges. One finds an institution in which the few college students who come are instructed by perhaps a single competent teacher, assisted by professors who are young boys just out of college. The salaries are pitifully small, the "dean" in such a college sometimes receiving not more than \$800 a year and the professors \$50 a month. The small endowment which has been given suffices to keep the institution alive and there is often poured into it a large measure of sincere but misguided devotion, the more to be regretted because the students who come to such an institution can usually

TABLE IX

Data concerning Partial List of Institutions in which Annual Expenditure for Instructing Salaries Ranges from \$10,000 to \$45,000

| Institution | Total Annual Income | Annual Appropriation for Salaries of Instructing Staff | Average Salary of Professor | Average Age of Entrance to Grade of Professor | Average Salary of Associate Professor | Average Salary of Assistant Professor | Total Number of Students in Institution | Total Instructing Staff in Institution | Ratio | Total Number of Students in College | Total Instructing Staff in College | Ratio |
|----------------------------|-----------------------|--|-----------------------------|---|---------------------------------------|---------------------------------------|---|--|-------|-------------------------------------|------------------------------------|-------|
| Iowa College..... | \$60,000 | \$44,250 | \$1,500 | 33 | \$1,000 | \$ 950 | ²¹ 553 | 35 | 15.8 | 450 | 31 | 14.5 |
| Polytech. Inst., Brooklyn. | 59,000 | 43,150 | 2,783 | | | 1,234 | | | | 250 | 40 | 6.2 |
| University of the South... | 60,845 | 42,836 | 1,500 | 35 | | 1,100 | ²¹ 317 | 34 | 9.3 | 119 | 11 | 10.8 |
| DePauw University..... | 67,000 | 42,750 | 2,000 | | | 850 | ²¹ 753 | 35 | 21.5 | 548 | 25 | 21.9 |
| Pomona College..... | 50,000 | 42,000 | 1,500 | | | ²² 1,050 | ²¹ 317 | 31 | 10.2 | 267 | 23 | 11.6 |
| Lafayette College..... | 77,142 | 40,374 | 2,000 | | | 1,370 | | | | 442 | 36 | 12.2 |
| Bowdoin College..... | 72,063 | 39,550 | 2,000 | 30 | | 1,350 | 394 | 53 | 7.4 | 305 | 20 | 15.2 |
| University of Wyoming... | 84,299 | 39,080 | 1,900 | 34 | 1,700 | 1,500 | ²¹ 222 | 30 | 7.4 | 110 | 21 | 5.2 |
| Colorado College..... | ²⁰ 60,000 | 38,000 | 1,775 | | | 1,056 | ²¹ 607 | 44 | 13.7 | 407 | 31 | 13.1 |
| Dickinson College..... | 61,748 | 37,576 | 1,700 | 33 | | ²¹ 1,200 | 392 | 26 | 15 | 314 | 18 | 17.4 |
| Adelphi College..... | 54,000 | 37,575 | 2,000 | | | 1,400 | ²¹ 463 | 27 | 17.1 | 295 | 24 | 12.2 |
| University of Arizona..... | 90,000 | 37,300 | 1,900 | | | 1,200 | | | | ²¹ 63 | ²³ 7 | 9 |
| Univ. of South Carolina... | 72,857 | 36,730 | 2,000 | | 1,500 | 1,200 | ²¹ 285 | 29 | 9.8 | 191 | 18 | 10.6 |
| Cornell College..... | 55,436 | 36,702 | 1,220 | 32 | | ²² 900 | ²¹ 455 | 39 | 11.6 | 395 | 27 | 14.6 |
| Woman's Col., Baltimore. | 67,151 | 36,450 | 1,818 | 32.5 | | ²² 1,167 | | | | 340 | 28 | 12.1 |
| Trinity College, Conn..... | 43,045 | 36,250 | 2,000 | | | 1,400 | | | | 208 | 22 | 9.4 |
| Beloit College..... | 75,000 | 35,000 | 1,600 | 32 | | 1,200 | | | | 303 | 30 | 10.1 |
| Wash. and Jeff. College... | 46,880 | 34,500 | 1,823 | | | | | | | 264 | 16 | 16.5 |
| Allegheny College..... | 47,000 | 34,200 | 1,800 | 34 | | 1,200 | | | | 266 | 19 | 14 |
| Lawrence University..... | 43,000 | 34,000 | 1,400 | 31 | | 950 | ²¹ 493 | 33 | 14.9 | 327 | 26 | 12.5 |
| Dalhousie University..... | 40,240 | 33,500 | 2,300 | | | ²² 1,500 | 358 | 48 | 7.4 | 266 | 21 | 12.6 |
| Trinity College, N. C..... | 63,000 | 33,060 | 1,850 | | | 750 | ²¹ 280 | 26 | 10.7 | 264 | 23 | 11.4 |
| Lake Forest College..... | 41,165 | 32,932 | 1,800 | 33 | | 1,300 | | | | ²¹ 217 | 19 | 11.4 |
| Rand.-Mac. Woman's Col. | ²⁴ 130,713 | 32,707 | 1,639 | 37.5 | | ²⁵ 1,307 | ²² 358 | | | | | |
| Hamilton College..... | 50,000 | 32,500 | 1,800 | | | 1,300 | | | | 178 | 19 | 9.3 |
| Rose Polytechnic Institute | 43,756 | 31,600 | 2,250 | 37.5 | 1,800 | 1,200 | | | | 229 | 23 | 9.9 |
| Colorado School of Mines. | 110,000 | 30,500 | 2,233 | | | 1,550 | | | | ²² 294 | 17 | 17.2 |
| University of Wooster.... | 43,057 | 31,380 | 1,500 | 37.5 | | ²¹ 1,100 | 547 | 34 | 16 | 362 | 28 | 12.9 |
| University of Montana.... | 71,500 | 30,100 | 1,800 | | | | ²² 247 | 20 | 12.3 | 189 | 19 | 9.9 |
| Olivet College..... | 46,600 | 29,200 | 1,300 | 35 | | 1,000 | ²² 255 | 29 | 8.7 | 211 | 20 | 10.5 |
| Albion College..... | 37,078 | 28,775 | 1,550 | 30 | | 900 | ²² 383 | 25 | 16.1 | 239 | 17 | 14 |
| Kenyon College..... | ²⁷ 47,000 | ²⁷ 28,500 | 1,600 | 32.5 | | | | | | 118 | 15 | 7.8 |
| College of Wm. and Mary | 43,000 | 28,495 | 1,800 | | | ²¹ 1,000 | | | | | | |
| Mt. St. Mary's College.... | 50,000 | 28,000 | ²⁸ 1,000 | | | ²⁸ 400 | | | | | | |
| Bates College..... | 39,167 | 26,500 | 1,433 | 32 | | | | | | 438 | 23 | 19 |
| Wilson College..... | ²⁴ 110,000 | 26,500 | ²⁸ 1,000 | 32 | | ²⁸ 900 | ²² 344 | 34 | 10.1 | 240 | 22 | 10.9 |
| Earlham College..... | 58,000 | 24,000 | 1,550 | 30 | | | ²² 380 | 31 | 12.2 | 325 | 27 | 12 |
| Wabash College..... | 41,608 | 23,550 | 1,600 | | | 930 | | | | ²² 291 | 17 | 17.1 |
| Carleton College..... | 34,900 | 23,150 | 1,400 | 32 | | ²¹ 1,300 | ²² 315 | 20 | 15.7 | 281 | 17 | 16.5 |
| Colby College..... | 56,939 | 23,033 | 1,800 | 32.5 | | ²¹ 1,350 | | | | ²² 237 | 15 | 15.8 |
| Marietta College..... | 24,244 | 22,670 | 1,433 | | | ²¹ 1,120 | 275 | 21 | 13 | 129 | 16 | 8 |
| Centre College..... | 32,369 | 21,827 | 1,600 | 30 | | | | | | ²² 154 | 20 | 7.7 |
| Hobart College..... | 37,200 | 21,657 | 1,700 | 35 | 1,400 | 1,100 | | | | 104 | 16 | 6.5 |
| Wells College..... | ²⁴ 90,041 | 21,150 | 1,600 | 36.5 | 1,275 | 900 | | | | 169 | 24 | 7 |
| Drury College..... | 29,000 | 21,000 | 1,400 | | | 687 | ²² 461 | 21 | 21.9 | 269 | 14 | 19.2 |
| Coe College..... | 23,137 | 20,989 | 1,200 | 30 | | 700 | | | | ²² 206 | 28 | 7.3 |
| Ripon College..... | 47,100 | 20,900 | 1,336 | | | 800 | ²² 201 | 24 | 8.3 | 157 | 20 | 7.8 |

TABLE IX—*continued*

Data concerning Partial List of Institutions in which Annual Expenditure for Instructing Salaries Ranges from \$10,000 to \$45,000

| Institution | Total Annual Income | Annual Appropriation for Salaries of Instructing Staff | Average Salary of Professor | Average Age of Entrance to Grade of Professor | Average Salary of Associate Professor | Average Salary of Assistant Professor | Total Number of Students in Institution | Total Instructing Staff in Institution | Ratio | Total Number of Students in College | Total Instructing Staff in College | Ratio |
|----------------------------|---------------------|--|-----------------------------|---|---------------------------------------|---------------------------------------|---|--|-------|-------------------------------------|------------------------------------|-------|
| Middlebury College..... | \$28,491 | \$20,160 | \$1,870 | 32 | | | | | | ²² 178 | 11 | 16.1 |
| Penna. Col. for Women... | 41,000 | 20,000 | ²⁸ 900 | 28 | | | | | | 45 | 10 | 4.5 |
| Elmira College..... | 38,139 | 18,672 | ²⁸ 1,000 | 30 | | | | | | 197 | 12 | 16.4 |
| Monmouth College..... | 36,967 | 18,500 | 1,270 | 35 | | \$1,075 | ²² 425 | 25 | 17 | 233 | 18 | 12.9 |
| Franklin College | 37,552 | 15,000 | 1,350 | 28 | | | ²² 214 | 15 | 14.2 | 160 | 13 | 12.3 |
| Clarkson Me. Sch. of Tech. | 24,540 | 11,950 | 1,350 | | | | | | | ²² 80 | 11 | 7.2 |
| Knox College | 28,012 | 11,509 | 1,400 | 32 | | 1,200 | ²² 521 | 27 | 19.2 | 224 | 19 | 11.7 |

²⁰ Interest at 5 per cent. on \$500,000 additional endowment will be available in 1909.

²¹ Entitled "associate professors."

²² Catalogue for 1906-7.

²³ Exclusively in college.

²⁴ Including payments of students for board.

²⁵ Entitled "adjunct professors."

²⁶ Catalogue does not separate the students in the department of music, of art and of physical culture from the students in the college.

²⁷ Including Bexley Hall, the theological seminary.

²⁸ Also board, apartments and laundry.

find much better instruction in near-by colleges, or high schools, where the teaching staff is stronger, the facilities better, and the temptations to low standards are not present. In some parts of the union, colleges which are only high schools are fulfilling a most useful educational function. It might well be considered by these latter colleges, however, whether it would not be better for education in general, and more dignified on their part, for them to discontinue granting the college degrees, and frankly call themselves high schools or academies or junior colleges.

At an early date the foundation hopes to present a thorough study of the institutions of higher learning in several states from the point of view of the area, population, material resources and probable expansion of each state. There are states

whose territory is so great or which are so divided by natural barriers that duplicate institutions may be justified, just as there are states whose citizens are justified in thinking more in terms of the future than of the present. All these things should be taken into account in estimating the field of higher education within a single state.

Occasionally in this paper figures will be given and comparisons made which might be considered to imply criticism of the internal administration of institutions. It must be remembered in this connection that there has been but little study in comparative college economics. It would seem that colleges and universities have managed their finances and drawn up their budgets with slight knowledge of similar problems in other colleges and universities. Data on this subject were not easily

obtainable. But from the data collected it is evident that widely differing systems of administration prevail.

Table II. does not contain the names of all the colleges and universities in the United States and Canada which pay \$45,000 or over in salaries annually to their instructing staffs, because some such institutions did not answer inquiries of the foundation, or return answers in a form available for statistical purposes. The table contains the names of one hundred and three colleges and universities in the United States and Canada which have given specific information that their total payments in instructing salaries exceed \$45,000 annually.^{10a}

*THE TEACHING OF MATHEMATICS TO
ENGINEERING STUDENTS IN
FOREIGN COUNTRIES¹*

YOUR committee has asked me to speak of the teaching of mathematics in foreign engineering colleges. My remarks will have reference almost exclusively to the German colleges and schools, partly because I am most familiar with the conditions existing in Germany and partly on account of the rather instructive campaign for reforming the whole teaching of mathematics, recently inaugurated in Germany.

As regards other countries I will only say that the situation in England and Scotland where, during the last quarter of a century, technical education has rapidly developed on quite characteristic and individual lines, deserves careful attention. But I am not sufficiently well acquainted with the facts to discuss this educational movement. In France, it is well known that the theoretical training given to engineers is on a very high level, higher even

^{10a} The data for instructors and assistants are not reproduced.—Ed.

¹ Read before Sections A and D, American Association for the Advancement of Science, and the Chicago Section of the American Mathematical Society, Chicago meeting, December 30, 1907.

than in Germany, I believe. Thus, the requirements for admission to the *École Polytechnique*, or even to the *École Centrale*, include in mathematics almost as much as our engineering students get in their college course. On the top of this preparation, the student receives in the *École Polytechnique* an excellent two years' course in higher analysis and theoretical mechanics, and then only is he allowed to enter upon his special technical work. It must also be taken into account that admission to the *École Polytechnique* is by competitive examinations held throughout France, so that this institution, receiving as it does the pick of students from the whole country, can maintain a high level of theoretical excellency. The *École des Ponts et Chaussées* and the *École des Mines* to which the student passes from the *École Polytechnique*, are thus what we might call graduate schools of the highest rank.

Turning now to the German engineering colleges, a comparison with our own best engineering colleges shows apparently but little difference, both as regards requirements for admission and as to the schedule of courses offered in the schools themselves. Nevertheless, I believe that the scientific standard is decidedly higher in the German than in the American engineering college. I am not here concerned with the question whether such a high standard of theoretical knowledge is essential, or even desirable, for the engineer; I merely state the fact. Moreover, it is quite possible that ultimately the average German engineer knows no more mathematics than the average American engineer. All I wish to maintain is that, in my opinion, an able German student, in his *Technische Hochschule*, or engineering university, can gain a more thorough scientific equipment than an equally able American student in his alma mater.